PARASITES 101

Parasites have co-evolved with their mammalian hosts for hundreds of thousands of years. In comparison, it is a relatively brief period that humans have attempted to control their presence with the use of anthelmintics (dewormers). Parasites, meanwhile, have shown an incredible knack for adapting and surviving our best efforts to eradicate them. Most recently, the frequent use of Doramectin and Ivermectin in camelids to prevent Meningeal Worm has altered the population dynamics and genetics of some parasites leading to resistance to these products. In addition, the indiscriminate use of other anthelmintics such as Fenbendazole and Amprolium is also suspected of leading to resistance.

Gastro-intestinal parasites are increasingly implicated as a cause of serious health problems affecting camelids. Economic losses include poor weight gain and growth, costs for treatment and prevention, and loss of animals from death. In addition to the problems arising from resistance, overstocking can make elimination of harmful parasites from the herd much more difficult.

No Easy Answer

Unfortunately, there is no easy answer. Prevention must be tailored to each individual farm. There are too many variables that will affect the life cycle of the parasites, the types of parasites present in a herd, the parasites' survivability in the environment, and even the likelihood of contamination of herd members.

Factors to consider include:

• The individual farm's geography: A farm in Maine, a farm in Georgia, a farm in Colorado, and a farm in California are all likely to encounter different problems. Variations will include climate, foliage, soil and even species of parasites.

• The farm's layout: This includes pasture design as well as shelter availability and location.

The ability (or lack of ability) to rotate animals to "safe" pastures and rest contaminated pastures will affect contamination and recontamination of herd mates.

• Deworming history of individual animals, farm history, stocking density, exposure to transient or outside animals, exposure to animals with unknown history or exposure to infected animals:

All of these factors will influence the level and type of parasitic challenge in the environment.

In addition, when formulating a parasite prevention or treatment plan, fecal egg counts should be used to measure the level of parasitic infection in a herd and the effectiveness of the eradication program.

Identifying at risk animals

While fecal egg counts are important in identifying parasites and degree of contamination, at risk populations and target groups also need to be established. Factors to be considered

include age, nutritional status and presence or absence of clinical signs. Younger animals, particularly crias and weanlings, are going to be your animals most susceptible to the presence of parasites in the environment. Animals that have a poor body condition, lack of weight gain or weight loss should also be evaluated for parasites. Those animals that are immunocompromised, suffering other diseases or under stress (i.e., recent weaning, transportation, change in environment) are also going to be in a high-risk category.

In many cases, clinical signs do not truly reflect the direct parasitic damage. Many of these parasites cause damage to the lining of the gastro-intestinal tract. This may affect the animal's ability to digest feed and absorb nutrients. Other parasites may cause anemia due to blood loss. Clinical signs, if present, may include lethargy, diarrhea, inappetance, weight loss, lack of weight gain, poor condition, sudden collapse, and death. The lack of clinical signs does not mean that an animal is not at risk of suddenly becoming very ill and/or dying.

Treatment will almost always involve deworming; however, even with effective elimination of parasites, severely affected animals may still be at risk of illness or dying due to secondary damage to the gastro-intestinal tract. In severe cases, aggressive supportive care may be needed. This may include I.V. fluids, plasma, and/or a blood transfusion. The economic ramifications involved in treating a sick animal or actually losing an animal make treatment more costly than prevention.

Posting “No Unauthorised Entrance” warning signs can help to control possible parasite contamination to your llamas or alpacas.

Fecal Egg counts

The only effective way of identifying individual at risk animals is through fecal egg counts. This allows the identification of the parasitic species involved, the degree of infestation, the degree of environmental contamination, and determines if and when animals should be dewormed. In addition, fecal egg counts can be used to evaluate the effectiveness of the anthelmintics being utilized.

If you request a fecal analysis from your veterinarian, make sure they are not using a simple fecal float for analysis. Because the level of parasites tends to be low, a special procedure known as a modified Stoll's method is used to separate the eggs from the other material in the test tube. If your veterinarian is not prepared to evaluate the fecal sample, they may choose to send it to a university with a veterinary teaching hospital where the sample can be analyzed by a parasitologist.

When evaluating a herd, fecal samples need to be collected and evaluated on a sufficient number of animals. A gold standard is to use fecal samples from 10 animals or 10% of the herd - whichever is the greater number. The herd average is a reflection of the environmental contamination. Once a sample is collected, it should be placed in a clean plastic bag or cup and labeled. If it is not going to be evaluated immediately, it should be placed in a refrigerator. A sample should be analyzed within a day or two of collection to obtain the most accurate results.

Fecal samples analyzed prior to treatment should be compared to fecal samples collected two weeks post-treatment to establish efficacy of the anthelmintic. A drop in parasite numbers of at least 90% should be observed. Most parasites have a two-three week life cycle. Waiting this long will allow any surviving parasites to repeat another cycle, reach maturity and have eggs present in the feces. A significant presence of parasites two weeks after treatment would indicate an ineffective "kill" by the anthelmintic utilized.

During extremely cold periods, parasites may go into a state of hypo-

biosis within the animal. This is a metabolically inactive period and may result in a carry over to the spring of a heavy parasite load. Fecal egg counts taken during a period of hypobiosis may result in false negative findings.

As with any of the pharmaceutical products used in veterinary medicine, anthelmintics are not labeled for camelid use. Extra-label use has been studied and safe dosages have been established. You should use extreme caution when using anthelmintics on pregnant animals or crias less than three months of age. If in doubt, consult with your veterinarian on the suitability of a product and its dosage.

So why would an anthelmintic fail? There are a number of reasons:

• **Resistance:** The frequent use of a single class of anthelmintic will encourage the development of resistance to any and possibly all drugs within that class. "Class" of anthelmintic refers to the "family" of chemicals used to produce the anthelmintic. Products within the same class use the same method of kill to eliminate the parasites. Anthelmintics from different classes use different kill methods. Parasites have survived every attempt man has made to eradicate them by developing resistance to kill methods. When this occurs, another kill method or class of anthelmintic must be utilized.

Example: Ivermectin and Doramectin are both Avermectins and therefore within the same class. Because they use the same kill method, rotating between them will most likely not decrease resistance! Fenbendazole is from a different class, Benzimidazoles, and should be effective if resistance to the Avermectins has developed.

• **Underdosing:** Dosing for the incorrect body weight will lead to the administration of the wrong dose. Underdosing can lead to an insufficient kill of the parasites. Not only will the problem then remain, it can be worsened as underdosing can contribute to the establishment of resistence to an anthelmintic.

• **Improper administration:** Spit happens! An anthelmintic will not be effective if it is spit onto the ground! Likewise, a subcutaneous injection will be ineffective if the needle is poked through the skin and the injection is squirted out the other side of the skin. If you are unsure of techniques, ask your veterinarian to review them with you.

• **Recontamination (part I):** Rotate! Rotate! Rotate! Returning animals to contaminated fields will lead to recontamination of the recently treated animals. Ideally, treat, wait 72 hours for any live parasites to be shed, and then move treated animals to a "clean" field. Keep in mind that if the animals are moved to a new field but are utilizing the same shelter, they may still be exposed to the same contaminated environment.

Keep in mind that human visitors can track in parasites to your farm on their shoes, clothing, and/or hands!

If environmental contamination is suspected, fecal samples analyzed prior to treatment should be compared to fecal samples collected six weeks post-treatment (don't confuse this with the two week check for anthelmintic effectiveness - you'll need to do both tests to distinguish between resistance and recontamination). The six week period allows sufficient time for animals to be re-exposed, re-infected, and allows sufficient time for the parasites to reproduce.

When planning how long to keep animals off of contaminated fields, keep in mind the conditions of the field, the climate, and the time of year. Many parasites thrive in warm, moist conditions and can survive in hospitable conditions in the environment. During hot, summer months, they may survive in the pasture for 30-60 days. This can be increased in cooler weather by up to 4 to 8 months depending on the species of parasite.

Rotating with other species can be useful to help manage field availability. However, while horses and donkeys are okay, sheep and goats share parasites with camelids and sharing grazing space with them can lead to very high parasite levels in the camelids.

• **Recontamination (part II):** If even one animal is not effectively dewormed, they can recontaminate your field and reinfect the rest of the herd! No drug is 100% effective. Also, not all animals will respond to a drug the same way. Retesting allows for the identification of ineffective drugs. It also allows for the identification of 'trouble animals'. These are the repeat offenders who continue to be infected following treatment.

Other considerations

• **Overcrowding:** The ideal stocking density is 3-4 llamas or 5-6 alpacas per acre. This does not include your rotational fields. If every available pasture is in use, there is no room for rotation. If the stocking density is higher than the suggested level, the animals are more likely to come into contact with fecal material and parasite eggs. If animals are being forced to graze near dung piles, there are too many animals or the grazing area is not large enough.

• **Farm layout and management:** Evaluate field dynamics to determine the ideal location for feeders and shelters. Try to separate the bathroom from the kitchen by placing feeders away from the dung pile. While it may be impossible to prevent defecating in or around the shelters, every attempt should be made to maintain cleanliness where the animals cush. If a dam cushes near a dung pile, the teats will likely be contaminated and the cria exposed to parasites.

Age segregation can help decrease exposure to susceptible youngsters. Adults can be asymptomatic carriers - shedding parasites without any disease or clinical signs of disease. The parasites that might not affect an adult may cause severe disease and even death in crias.

• **Biosecurity:** Quarantine all new animals - including animals brought in for breeding, returning from breeding farms, or returning from events. Younger animals and pregnant females in particular should never be exposed to transient animals. Keep in mind that human visitors can track in parasites to your farm on their shoes, clothing, and/or hands! Plastic booties and hand washing are two sensible examples of how risk can be decreased.

Aside from a quarantine area, consider establishing a remote area on your farm for mobile breeding. This may involve either shipping in a stud to cover your females or shipping in females for a one day breeding only to your male. The transient animal is brought to a pen that is only used for breeding. Other then the animals being bred, no other animals should enter this pen. The pen is then disinfected following breeding - rubber mats are easier to disinfect than a dirt floor. If you must keep breeding animals overnight or for any extended period of time, you should have quarters for them separated from the rest of your herd.

Good biosecurity practices not only keep parasites from sneaking into your herd, but also can help prevent the spread of infectious disease!

Decreasing the use of drugs:

• **Hygiene:** Cleaning dung piles is a start, but keep in mind that feces may also be tracked on foot pads and deposited into shelters & near feeders. Keep these areas clean and avoid feeding off of the ground.

• **Utilize pastures / grazing systems:** Ideally, stay within the suggested stocking density and practice field rotation. If your stocking density is higher than ideal, try to develop grazing strategies to allow higher numbers of animals on less land. This may involve splitting existing fields to allow for some field rotation. Long, narrow lots are less efficient than square/rectangular lots.

• **Optimize host immune resistance:** A healthy animal will be more resistant to parasites and to the effects of parasitism. You can improve your animals' immune function through good nutrition.

Take home message:

• Work with your veterinarian in establishing good strategies to prevent illness due to parasites.

• Frequent deworming is destined to create resistance to the chemicals being used!

• Use management and fecal egg counts to decrease the exposure to parasites and the use of chemicals.

Biography:

Shari C. Silverman is a graduate of the University of Pennsylvania School of Veterinary Medicine. Good health management and a need for compassionate care for small ruminants, camelids, and horses are what prompted Dr. Shari Silverman to establish Abbey Rose Veterinary Services. Serving clients and patients throughout New Jersey and Eastern Pennsylvania, the practice provides wellness programs, educational seminars and programs, as well as emergency services 24 hours a day, 7 days a week. In her spare time, Dr Silverman flies planes, kayaks and plays on her farm where she lives with her husband and many different animal friends.

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